COMMON FOOD DYE TURNS SKIN TRANSPARENT

Scan to review worksheet

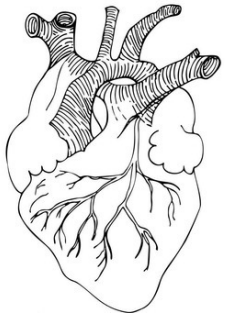
Expemo code:
1EQT-B1LC-F13

1 Warm up

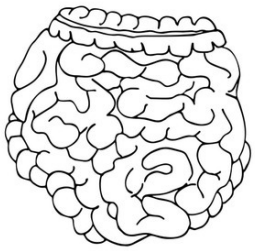
In pairs, look at the image of the human body. Match the organs to their correct names. What kinds of illnesses or health problems might you associate with each organ? Discuss in pairs.

bladder | brain | heart | intestine
kidneys | liver | lungs | stomach

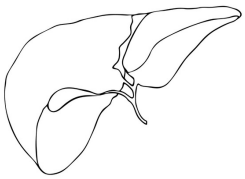
1. _____



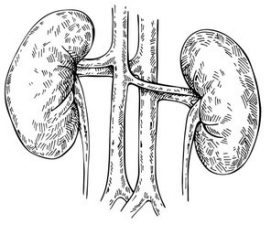
2. _____



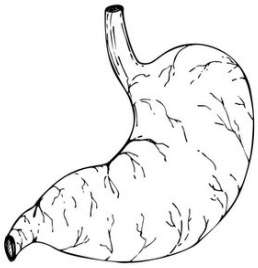
3. _____



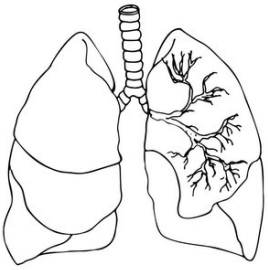
4. _____



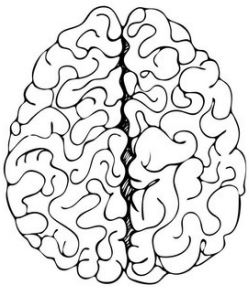
5. _____



6. _____



7. _____



8. _____

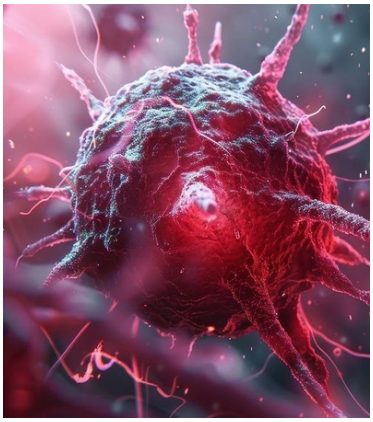
2 Pre-listening task: general and medical vocabulary

Part A: Match words with the correct image.

abdomen	biopsy	blood vessel
colourant	intestine	liver
scalp	tumour	vein

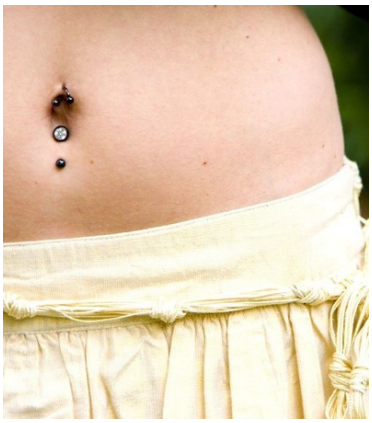
1. _____

2. _____



3. _____

4. _____



5. _____

6. _____

7. _____

8. _____

9. _____

Part B: Match words with the correct definitions.

1.	dissolve (v)	a.	put something or make something go under the surface of water or liquid
2.	transparent (adj.)	b.	(of water, air, glass, etc.) make waves, such as those of light, sound or energy, change direction when they go through at an angle
3.	diagnose (v)	c.	spread an oily or soft substance over a surface
4.	phlebotomist (n)	d.	containing water
5.	refract (v)	e.	make a solid become part of a liquid
6.	aqueous (adj.)	f.	allowing you to see through it
7.	smear (v)	g.	say exactly what an illness or the cause of a problem is
8.	submerge (v)	h.	a person who is trained to take blood from a patient

Part B: Discuss these questions in pairs.

1. Which organs can be found in the abdomen?
2. Why do you think colourants are used in food? What else might they be found in?
3. Do you think we will still need to conduct biopsies in order to diagnose diseases in the future? Why/why not?
4. What kinds of future technologies could help phlebotomists?

3 Listening for specific information

Listen to the report. Tick the items you hear mentioned. Which three items were not mentioned in the audio?

- ☐ muscle
- ☐ hair
- ☐ snacks
- ☐ molecules
- ☐ operations
- ☐ mouse
- ☐ organs
- ☐ paper
- ☐ diseases
- ☐ scientists

4 Listening comprehension

For each question, select the answer that most accurately reflects the information given in the audio. Listen to the report again to check your answers.

Group 1:

1. Where is the research team from?

   a. Stafford University b. Stratford University c. Stanford University

2. Which organs were researchers able to see by applying the dye to a mouse?

   a. the kidneys, heart and lungs

   b. the liver, intestines and brain

   c. the heart, stomach and kidneys

3. What colour does skin turn when the dye is applied?

   a. bright yellow b. a pale red c. a rich red

4. What is the name of the dye that was used?

   a. tartrazine b. tarzan c. margarine

5. According to the report, which snack food can the dye be found in?

   a. ice cream b. Dorito's c. chocolate

Group 2:

1. Researchers examined the way skin scatters and...

   a. reflects light b. is damaged by light c. refracts light

2. The experiments showed that tissue containing lots of fats and proteins...

   a. bent less light than aqueous tissue

   b. bent more light than aqueous tissue

   c. didn't bend light at all

3. One possible application would be allowing tumours to be diagnosed without what?

   a. biopsies b. x-rays c. a medical team

4. How could the dye help phlebotomists?

   a. It could help them to spot rare blood diseases.

   b. It could show them how much blood a person has in their body.

   c. It could make it easier for them to locate veins under the skin.

5. Which naturally transparent animal is mentioned in the report?

   a. zebra b. jellyfish c. zebrafish

5 Pre-reading task: general vocabulary

Part A: You are going to read an article about new approaches to diagnosing diseases. Scan the text quickly and find words that match the synonyms and definitions below in each section.

1. _____ (n, para. 1): smells
2. _____ (adj., para 1.): enhanced
3. _____ (n, para. 2): altering
4. _____ (adv., para. 3): happening at exactly the right time
5. _____ (n, para. 3): action taken to improve a medical condition or illness
6. _____ (adj., para. 3): incorrect
7. _____ (n, para. 3): the desire to do or have something that you know is bad or wrong
8. _____ (v, para. 3): give part of your work, power or authority to somebody in a lower position than you

Part B: Look at the sentences below. What do the underlined phrases in each sentence mean? Do you think the government should keep tabs on everyone, even if they haven't committed a crime? Are you pinning your hopes on any future technological advances? Discuss in pairs.

My boss wants to **keep tabs on** us by watching us work from home via a webcam.

The company is **pinning its hopes on** a new phone, which they say is a big improvement on the previous version.

New approaches to spotting illness

Tartrazine may one day be used to help diagnose disease in patients, but the science of diagnostics is entering an exciting new era. We look at three new approaches to diagnosing health problems.

1. **Animal Diagnosis**

We have employed the aid of animals in our daily lives for thousands of years. Could they now be used to help us diagnose diseases? Studies have successfully shown that certain types of creatures can detect illness in human subjects. Biodetection dogs have been used to spot signs of diseases such as Parkinson's, malaria and bladder cancer, while medical alert dogs are trained to recognise certain symptoms, allowing their owners to predict a seizure or other potentially life-threatening issue. Dogs are able to identify health problems due to their impressive sense of smell, which is believed to be around ten thousand times more effective than that of humans. The animals are trained to associate certain odours with a treat or reward.

Dogs aren't the only animal capable of detecting disease in humans. Rats and even bees have proven capable of spotting signs of illness – from tuberculosis to Covid-19. Both rely on their heightened sense of smell and, like dogs, can be trained to respond to rewards. However, due to regulations, animals are not commonly used in disease diagnosis – although this could change in the future, particularly if another pandemic breaks out.

2. **Smart Tech**

Technology has been revolutionising many aspects of our lives, but the fitness tech market continues to grow. Wearable smart tech that monitors our health is becoming more and more popular, from rings to watches. Typically, such devices display information about heart rates and sleeping patterns, but, with a bit of tweaking, they could be used to spot early warning signs of disease. Researchers from Cardiff University found that Parkinson's disease could be diagnosed years before common symptoms emerged, through data collected by smartwatches.

Smart tech can also be used to manage existing health problems, such as contact lenses that keep tabs on glucose levels in tears and blood – useful for those suffering from diabetes. More unusual health-orientated smart tech includes modified toilets that can identify bowel disease or kidney problems, and shopping trolley sensors that scan for certain heart problems which can indicate a risk of stroke.

3. **Artificial Intelligence**

While the majority of AI companies appear to be focused on commercial chatbots and image generators, the technology is quietly being employed in the medical world. Artificial intelligence can help to speed up disease diagnosis by processing large amounts of data in seconds. Researchers from the University of Waterloo developed a new AI tool to identify disease markers by creating their own machine-learning system. The system, which the team called the Trustworthy Deep Learning Framework for Medical Image Analysis, is more effective than existing techniques, according to the researchers. Those pinning their hopes on AI in medicine believe that the technology could allow for timely interventions, saving lives and reducing suffering.

However, there are a number of concerns around artificial intelligence. Its ability to "hallucinate" – returning erroneous information in response to genuine instructions – has led many to question the safety of AI in the medical world. Others are concerned that there would be a temptation to delegate too many tasks to artificial intelligence, meaning that any mistakes AI might make would prove more costly.

Sources: The Washington Post, The Guardian, BBC, Stanford Report

6 Reading comprehension

Read the article again. For each question, select the correct option to finish the sentence according to the information given in the article.

1. Studies have shown that certain types of animals can ***be used for medical purposes / help to cheer people up / detect diseases in human subjects***.
2. A dog's sense of smell is thought to be ***a hundred thousand times more powerful than that of humans / ten thousand times more powerful than that of humans / a thousand times more powerful than that of humans.***
3. Animals are not commonly used in disease diagnosis due to ***difficulty in training them / regulations / ethical concerns.***
4. Popular examples of wearable smart tech that can monitor our health are ***rings and watches / shirts and dresses / socks and shoes.***
5. Researchers from Cardiff University found that Parkinson's disease could be diagnosed early if patients wore a ***special ring / necklace / smartwatch.***
6. Smart contact lenses could help people who suffer from ***obesity / blindness / diabetes***.
7. AI can speed up disease diagnosis by ***processing large amounts of data in seconds / allowing patients to diagnose themselves without needing a doctor / accessing the personal information of a patient that has been collected through social media.***
8. Researchers from the University of Waterloo developed their own ***mobile phone app / smartwatch / machine learning system***.
9. Many have questioned the safety of using AI in medicine due to its ability to ***hallucinate / dream / replace workers***.

7 Optional task: medical and scientific vocabulary

Part A: Using the text above for reference, complete the definitions of the medical and scientific vocabulary below by filling in the gaps with the correct words from the list.

attack blood vessel liquid nervous organs tube unconscious

1. **bladder (n) -** an organ that has the shape of a bag in which _____ waste collects before it is passed out of the body
2. **seizure (n) -** a very sudden attack of an illness in which someone becomes _____ or develops violent movements
3. **bowel (n) -** the _____ along which food passes after it has been through the stomach, especially the end where waste is collected before it is passed out of the body
4. **tuberculosis (n) -** a serious infectious disease that can _____ many parts of a person's body, especially their lungs
5. **Parkinson's (n) -** a disease of the _____ system that gets worse over a period of time and causes the muscles to become weak and the arms and legs to shake
6. **stroke (n) -** a sudden serious illness when a _____ in the brain bursts or is blocked, which can cause death or the loss of the ability to move or to speak clearly
7. **kidney (n) -** either of the two _____ in the body that remove waste products from the blood and produce urine

Part B: Put the items from part A into the correct categories below.

1. parts of the body: _____
2. diseases, illnesses or symptoms: _____

8 Talking point

In pairs or small groups, discuss the following questions.

1. Can you think of any other examples of food items being used for medical purposes?
2. Do you generally avoid eating food that has lots of colourings, preservatives or other chemicals? Why/why not?
3. Will we ever be able to make human beings invisible?
4. Do you use any smart technology (such as smartwatches or rings) to monitor your health? If not, would you be interested in doing so?
5. Would you trust AI to diagnose a disease correctly? Why/why not?
6. Can you think of any potential problems that could occur if tartrazine is used to dye human skin?

9 Optional extension: group discussion and essay

Task A: Write an opinion essay on ONE of the topics below. Your essay should agree with or disagree with the statement and should be between 260 – 320 words.

Topic 1:

The best way to prevent deaths and long-term disability related to disease is to improve diagnostic techniques.

Topic 2:

We should be careful not to replace trained medical staff, such as doctors, with emerging technologies.

Task B: Split into groups. Together, think about ways in which the newly-discovered properties of tartrazine could be used in the following areas. Present your ideas to the class.

1. tourism and transport
2. security
3. education
4. healthcare

Transcripts

3. Listening for specific information

Newsreader: Researchers have discovered that a common food dye can make skin, muscle and connective tissues temporarily transparent.

Newsreader: The team, from Stanford University, found that applying the dye to the abdomen of a mouse made organs such as the liver and intestines visible. Smearing the substance on the animal's scalp enabled scientists to see blood vessels in the mouse's brain.

Newsreader: The dye turns the skin a rich red, but the colour washes off easily. As a food colourant, the dye – tartrazine – can be found in snacks such as Dorito's and orange juice drinks in the US.

Newsreader: In conducting the study, the researchers examined the way in which skin scatters and refracts light – how light changes speed and bends when moving from one material to another. Their experiments showed that tissue containing lots of proteins and fats bent more light than aqueous skin tissue.

Newsreader: When the team dissolved tartrazine in water and submerged animal tissue in the mixture, the dye molecules bent light in the same manner as cell components within the tissue, preventing light from scattering.

Newsreader: The researchers behind the study believe that their findings could open up a wide range of applications in humans, such as diagnosing diseases or identifying tumours without biopsies, or helping phlebotomists locate veins under the skin.

Newsreader: However, further studies will need to be conducted in order to ensure that the procedure is safe and effective in humans.

Newsreader: Aside from potentially aiding doctors, the discovery could be of use to scientists studying animals for disease progression. Currently, creatures that are naturally transparent, such as zebrafish, are selected for study, but tartrazine could allow all kinds of animals to be examined.

Key

1. Warm up

5 mins.

Tell the students they will be listening to a report about a common food dye that has been shown to turn skin transparent, and reading an article examining three new approaches to disease diagnosis. The discussion activity is suitable for pairs or small groups.

1. bladder
2. heart
3. intestine
4. liver
5. kidneys
6. stomach
7. lungs
8. brain

2. Pre-listening task: general and medical vocabulary

Part A:

5 mins.

Ask students to match the words with the correct images.

1. scalp
2. biopsy
3. tumour
4. colourant
5. abdomen
6. intestine
7. vein
8. blood vessel
9. liver

Part B

5 mins.

Ask students to match the words with the correct definitions.

1. → e. 2. → f. 3. → g. 4. → h. 5. → b. 6. → d. 7. → c. 8. → a.

Part B:

5 mins.

For this part, students should discuss the questions in pairs.

3. Listening for specific information

5 mins.

Individually or in pairs, ask students to listen to the report and tick the items they hear mentioned. Students should identify the three items that were not mentioned in the recording.

Items not mentioned: hair, paper, operations.

- ☑ muscle
- ☑ mouse
- ☑ organs
- ☑ snacks
- ☑ molecules
- ☑ diseases
- ☑ scientists

4. Listening comprehension

5 mins.

Individually or in pairs, ask students to select the answer that best fits each question, before listening again to check.

Group 1:

1. c. 2. b. 3. c. 4. a. 5. b.

Group 2:

1. c. 2. b. 3. a. 4. c. 5. c.

5. Pre-reading task: general vocabulary

Part A:

5 mins.

Ask students to skim through the text quickly and match the synonyms and definitions to the key vocabulary in each paragraph.

Glossary:

hallucinate - (of an artificial intelligence system) create wrong information

1. odours 2. heightened 3. tweaking 4. timely
5. interventions 6. erroneous 7. temptation 8. delegate

Part B:

5 mins.

For part B, students should discuss the underlined phrases in pairs.

keep tabs on somebody/something - watch somebody/something carefully in order to know what is happening so that you can control a particular situation

pin (all) your hopes on someone/something - rely on somebody/something completely for success or help

Sources:

https://www.washingtonpost.com/science/2024/09/05/see-through-transparent-mice-food-dye/

https://www.theguardian.com/science/article/2024/sep/05/common-food-dye-found-to-make-skin-and-muscle-temporarily-transparent

https://news.stanford.edu/stories/2024/09/using-a-common-food-dye-researchers-made-mouse-skin-transparent

https://www.bbc.com/news/technology-68607059

6. Reading comprehension

10 mins.

Students should read the text again, and use the article to select the correct ending for each sentence.

1. detect diseases in human subjects
2. ten thousand times more powerful than that of humans
3. regulations
4. rings and watches
5. necklace

6. diabetes
7. processing large amounts of data in seconds
8. machine learning system
9. hallucinate

7. Optional task: medical and scientific vocabulary

Part A:

5 mins.

Ask students to complete the definitions of the target vocabulary items with the correct words from the list.

1. liquid
2. unconscious
3. tube
4. attack
5. nervous
6. blood vessel
7. organs

Part B:

5 mins.

For part B, students should arrange the vocabulary items into the correct categories.

1. PARTS OF THE BODY: bladder ≀ kidney ≀ bowel
2. DISEASES, ILLNESSES OR SYMPTOMS: Parkinson's ≀ tuberculosis ≀ stroke ≀ seizure

8. Talking point

10 mins.

Ask students to discuss the questions in pairs or small groups.

9. Optional extension: group discussion and essay

Task A:

40 mins.+

For the first option, students should write an opinion essay based on one of the given topics. Encourage students to choose a side and argue in favour of that position. Essays should be between 260 – 320 words.

Task B:

15 mins. +

Students should work together to discuss potential applications of tartrazine in the given fields. You may wish to do this as a class brainstorm activity if pressed for time. Students should share their ideas with the class.